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Hotwater :insulate and save!



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## LOWERING HOT WATER EXPENSES

In a typical American home, hot water heating is the second largest energy consumer, after space heating. Despite this fact, it is often overlooked during home energy improvements. The cost of heating water will typically be 15-20 percent of your bill. If your water is heated electrically, it costs about \$150 a year to heat—\$125 if you use natural gas. You can save up to 25 percent of your yearly water heating expenses by conserving and improving the efficiency of your water heating system.

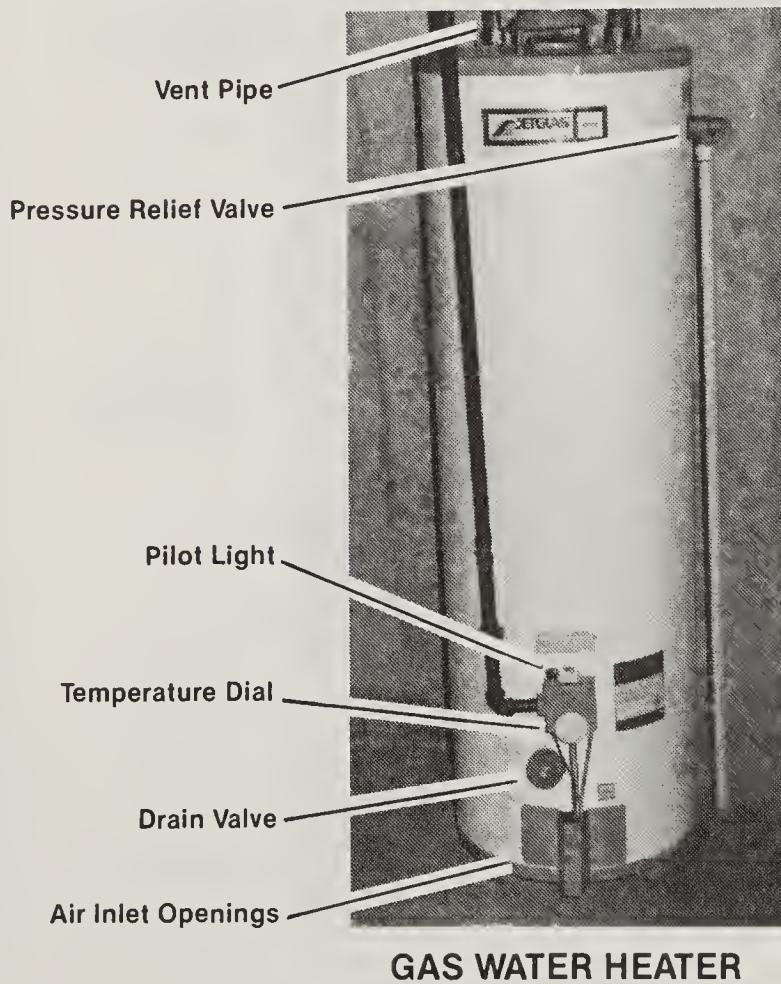
One way to improve the efficiency of your hot water heater is to reduce "stand-by" energy losses. Stand-by loss is the energy or heat which radiates continuously from the tank walls to the surrounding air. You cannot prevent all stand-by losses from taking place, but you can dramatically reduce the rate of energy lost by adding a blanket of insulation to the tank. If your water heater is located in an unheated space, such as a garage or basement, you will realize significant energy savings.

## ADDITIONAL INSULATION ON A HOT WATER TANK SAVES ENERGY

Older water heaters, when compared to today's newer energy-conserving models, were poorly insulated. The older models came from the factory equipped with 1-1½ inches of fiber-glass insulation, which has an R value of five. The R value indicates a resistance to heat flow, or the effectiveness of insulation. The higher the number, the better the insulating quality of the

material. In contrast, energy-conserving models are furnished with up to 3 inches of foam insulation with an R value of twenty. An additional insulation wrap should be added for the same reason that you may have increased the insulation level in your home—rising energy costs makes the investment cost effective. Insulation added to the tank can reduce stand-by losses by 50 percent in many older water heaters.

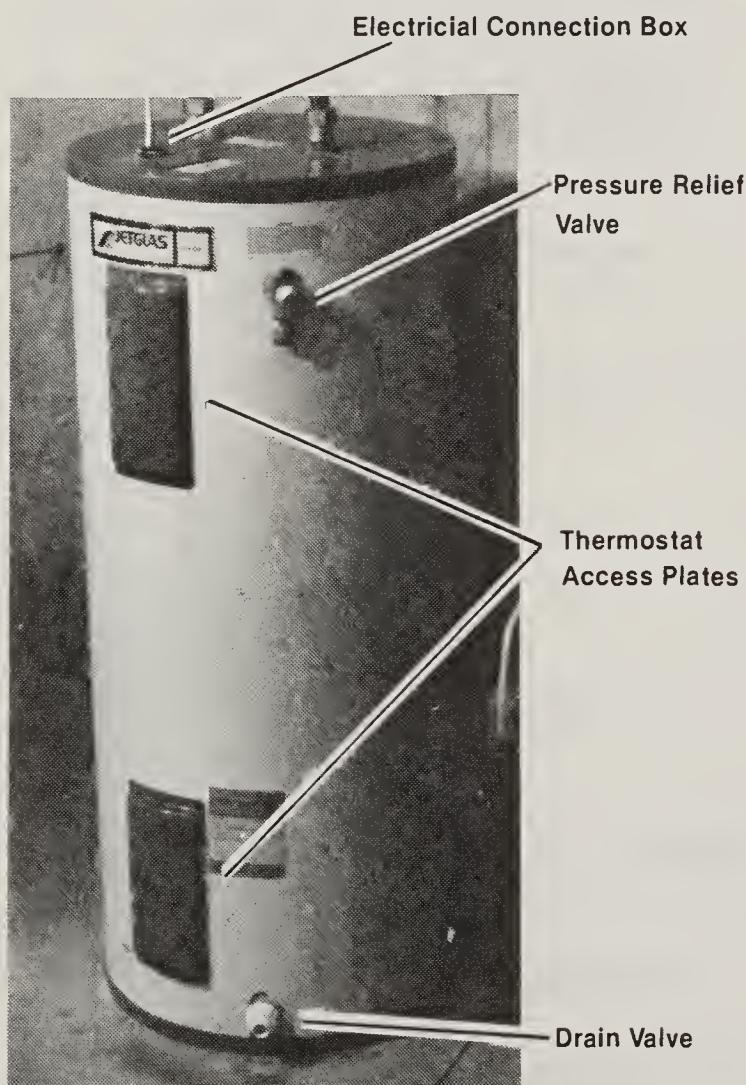
If you now own a water heater which is labeled as an energy efficient appliance, it does not need additional insulation. An extra blanket of insulation will still save you energy, but not to the same degree as insulating an older, poorly insulated tank. Energy efficient models usually carry a name plate on the tank reading "Energy Saver," "Fuel Trimmer," "Power Miser," or similar terminology.



## YOU WILL SAVE MONEY BY INSULATING YOUR WATER HEATER

Installing a 1-1½ inch thick, R value 5, fiberglass insulation wrap on a 40 gallon tank will save you about \$17 per year if you have an electric water heater, or about \$11 a year if you use natural gas. As energy costs continue to go up in the future, the dollars you save will increase each year. A water heater wrap is one of the few energy conservation investments which can pay for itself in less than a year in many cases.

(Annual savings are based on average electricity costs of 3.5 cents per kWh and \$4.60 per mcf for natural gas and assuming a 70 degree F temperature difference between the surrounding air and the hot water heater.)



ELECTRIC WATER HEATER

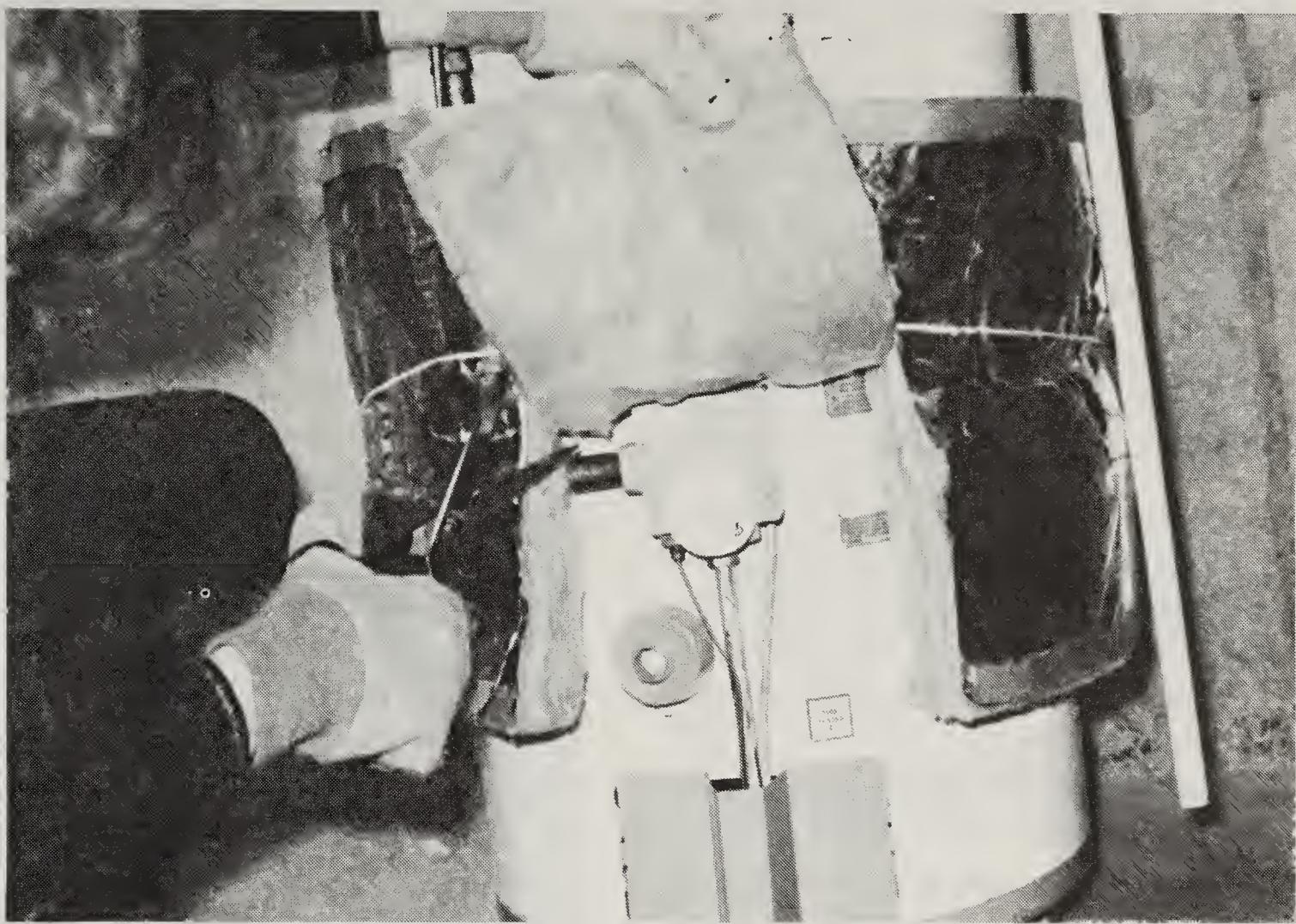
## WRAPS ARE INEXPENSIVE AND READILY AVAILABLE

Water heater wraps are available at your local lumber yard, hardware store, and discount center. A water heater wrap kit contains a large sheet of vinyl-faced fiberglass insulation, vinyl tape and step-by-step instructions to completely wrap a hot water tank. Wraps cost from \$12 to \$17 down to as low as \$8 on sale. A water heater wrap can also be made from a roll of 15 inch wide fiberglass batt insulation, which costs around \$15. Wrap kits are easier to install and are usually cheaper than homemade wraps, unless you can use insulation left over from another project.

Your cost will be even lower if you remember to take advantage of the 15 percent federal and 5 percent state tax credits that apply to water heater wraps.

## HOT WATER HEATER WRAP SAFETY CONCERNS

Underwriters Laboratories, Inc., a testing lab for product safety, issued a warning to consumers that improperly adding insulation to an electric water heater could pose a safety hazard. The safety concern with electric heaters is that added insulation may overheat the electrical service conductor insulation and create a fire hazard. Electrical wiring in the water heater is rated to operate under certain temperature conditions, normally with a water temperature setting less than 170 degrees F. Underwriters Laboratories recommends that insulation be kept away from thermostat controls and the connection box where the heater is connected to the house wiring. Recent studies by the Bonneville Power Administration have shown that a partial



water heater wrap (thermostat access plates and connection box uninsulated) does not overheat the wiring when water temperatures are less than 160 degrees F. The study demonstrated that if your water temperature is 140 degrees F or lower, you can safely cover the thermostat access plates with a piece of insulation taped into place, thus allowing access. If your water temperature is 130 degrees F or less, you can insulate the connection box (terminal cover) in a similar manner.

A gas water heater should receive careful attention when adding a water heater wrap. You do not want to restrict air movement around combustion air openings or interfere with the flow of flue gases up the vent pipe. Do not cover combustion air openings, controls, relief valves or the top of the tank. Consult with your local gas company if you are uncertain about the safety considerations.

## HOW TO WRAP YOUR WATER HEATER

Commercially available wraps present a neat appearance, but the job can also be done with a roll of fiber-glass batt insulation.

### Materials Needed:

- One roll of duct tape, 15 yards long and 3 inches wide
  - One roll of foil or paper faced fiber-glass insulation, 15 inches wide and 3½ inches thick (R-11)
  - Work gloves, tape measure, scissors and string
1. Measure the distance around your water heater and add 28 inches to that measurement. The additional 28 inches is needed to accommodate the 3½ inch thickness of the insulation, allowing for a small overlap. No matter how big around the water heater is, 28 inches will always be enough.

2. The roll of insulation is only 15 inches in height. Measure your water heater and determine how many strips you will need. For example, if your water heater is 60 inches high, you will need four strips. For gas and oil water heaters, measure from 6 inches above the bottom of the heater to the top, you must allow clearance for combustion air to reach the burner.

3. Use this example to calculate your insulation needs, if your water heater is 66 inches around and 60 inches high:

$$66 \text{ inches} + 28 \text{ inches} = 94 \text{ inches} \text{ (one strip)}$$

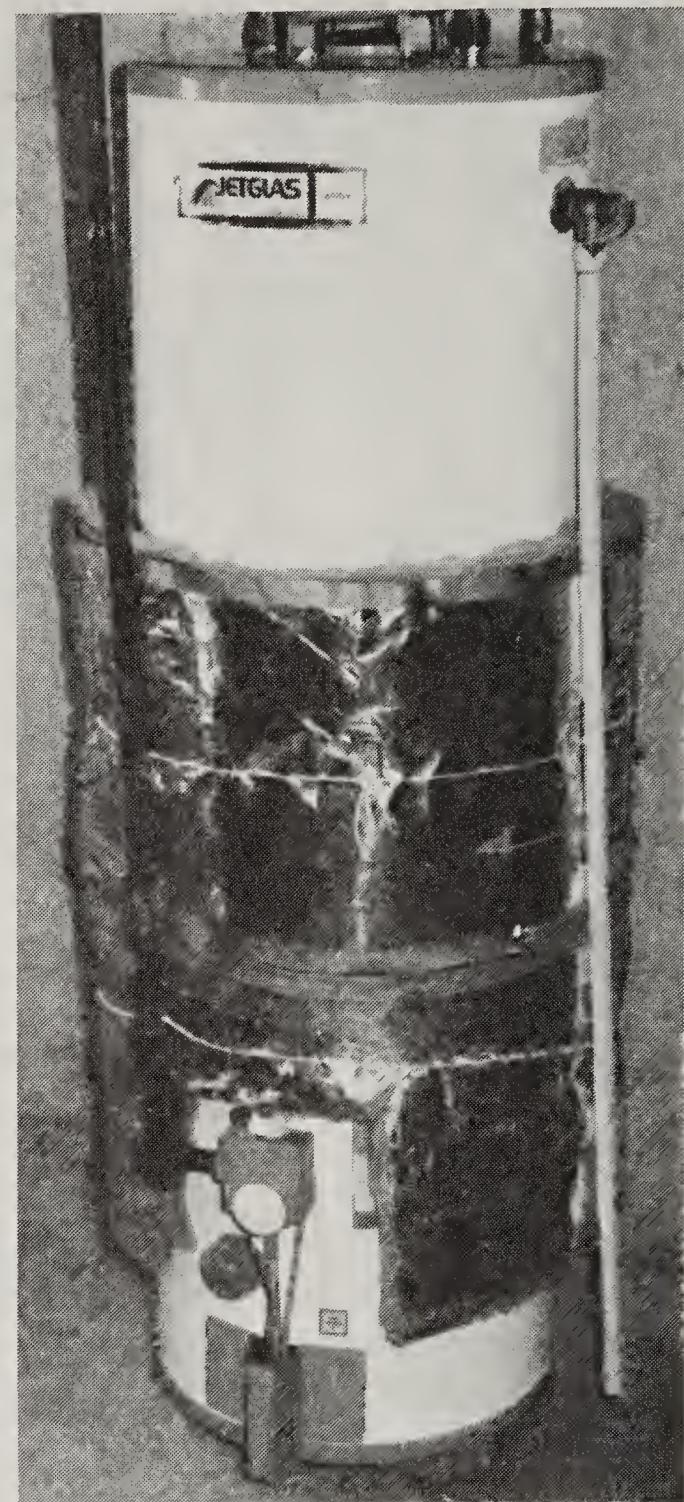
$$60 \text{ inches} \div 15 \text{ inches} = 4 \text{ (number of strips)}$$

$$94 \text{ inches} \times 4 = 376 \text{ inches} \text{ or } 31\frac{1}{3} \text{ feet}$$

Any insulation left can be used to insulate the rim joist area in the basement. (Rim joists run on top of the basement or crawl space foundation and below the floor joists.)

#### Installing the Insulation: Electric Heaters

1. The insulation is installed with the foil or paper facing the outside.
2. Wearing gloves, cut the insulation into the appropriate number of strips.
3. Fit one piece of insulation around the heater and mark the exact amount of overlap. Lay the insulation on the floor and, using a sharp knife, remove fiberglass from backing in the area where the fiberglass overlaps itself. Repeat with remaining strips.



4. Install the bottom strip first, making sure it touches the floor (electric heaters only). Hold the batt securely against the heater with string.
5. Repeat this procedure up to top of tank, making sure to align overlap seams vertically. Cut and remove fiberglass around service openings (thermostatic access covers, electrical connection box, drain valves). Replace cutouts with duct tape to hold edges in place. This allows access to these areas for servicing.

6. When all batts are in place, tape the vertical seam. Next tape horizontal seams (string stays in place). The tape will not stick to the backing so it must stick to itself.
  7. Cut two half-circles out of remaining insulation and fit together to make an insulating cover for the top of the heater, cutting slits for the pipes. Bring the sidewall insulation around these pieces and tape firmly.
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2. Continue adding each strip as detailed in the preceding section, securing with string. The top strip should be flush with the top of the heater.
3. When all strips are in place, tape the vertical seam, then the horizontal seams.
4. **Do not insulate the top of the tank, pressure relief valve, overflow pipe outlet, drain valve or vent pipe on gas or oil tanks.**
5. Be sure to install the wrap so it does not slip down. This would restrict the flow of air to the gas burner and create a safety hazard.

## **WATER HEATER WRAP KIT INSTRUCTIONS**

Water heater wrap kits contain a large blanket of vinyl-faced insulation and vinyl tape to secure the insulation blanket. Installation tools needed are: scissors, measuring tape, marking pen, and gloves.

1. Measure blanket for cutting by wrapping blanket loosely around heater and temporarily secure with short pieces of tape at the top and bottom. On electric heaters the blanket can cover the top of the tank. With gas heaters the blanket should only reach to the top of the tank. The blanket should now be secure and allow you to easily mark on the outside areas to be cut out or trimmed.
2. Allow 4 inches of the blanket to overlap itself and mark a line down the width of the blanket for trimming. Next, make a mark where the bottom of the blanket should be trimmed. In the case of electric heaters only, the blanket can reach to the bottom of the tank. On gas

### **Installing the Insulation: Gas Heaters**

1. Measure insulation as you would for an electric hot water heater. Using fire-resistant-faced fiberglass insulation, wrap the first strip a minimum of 6 inches above the bottom of the water heater. Cut out an opening for the pilot light and temperature control panel, allowing at least 2 inches of clearance around this area.

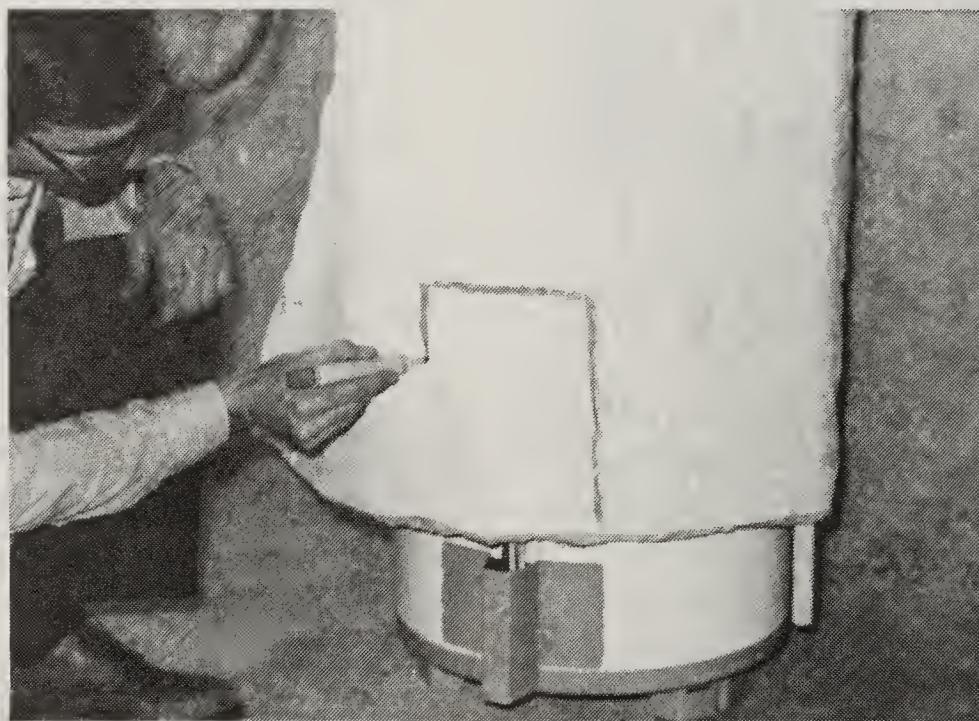
heaters allow at least 6 inches on the bottom of the blanket to be exposed; do not cover air inlet areas.

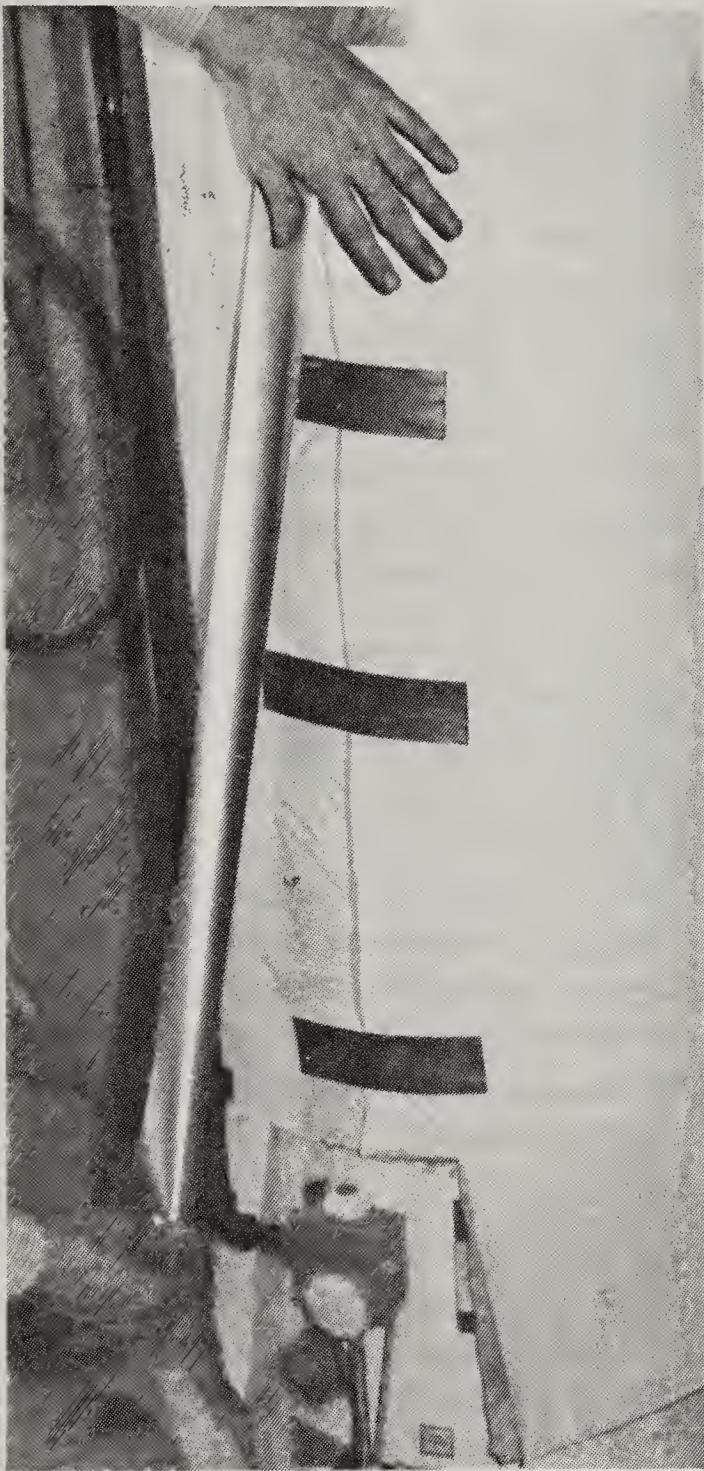
Finally, mark areas on electric water heaters which must be left exposed, thermostat access covers, electrical connection box, pressure relief valve, and drain valve. On gas heaters allow at least 2 inches of clearance around pilot lights and temperature control areas and mark cutout openings for the pressure relief and drain valves.

3. Remove the blanket and lay it on a flat surface. Trim and cut out the areas you have marked. Cut a piece of vinyl tape which will run the entire length of the seam. Cut the rest of the tape into seven equal lengths. It is a good idea now to wipe dust and dirt off the heater to allow for a clean surface for the tape to adhere to.

4. Wrap the blanket around the heater again and use the shorter lengths of vinyl tape to join sides of the blanket at the top, middle, and bottom.

5. Next secure the blanket to the top of the heater with four pieces of tape. With electric heaters the blanket can cover the top. Wrap kits for gas heaters come with an uninsulated top flap that extends over the top of the tank. You may want to make several cuts on the blanket to allow you to fold the blanket down neatly on top of the heater. Be careful not to cover any portion of the vent pipe area on gas heaters.
6. With the long piece of tape secure the entire blanket seam from top to bottom.
7. Check once again to make sure that you have not covered any critical areas with the insulation blanket.



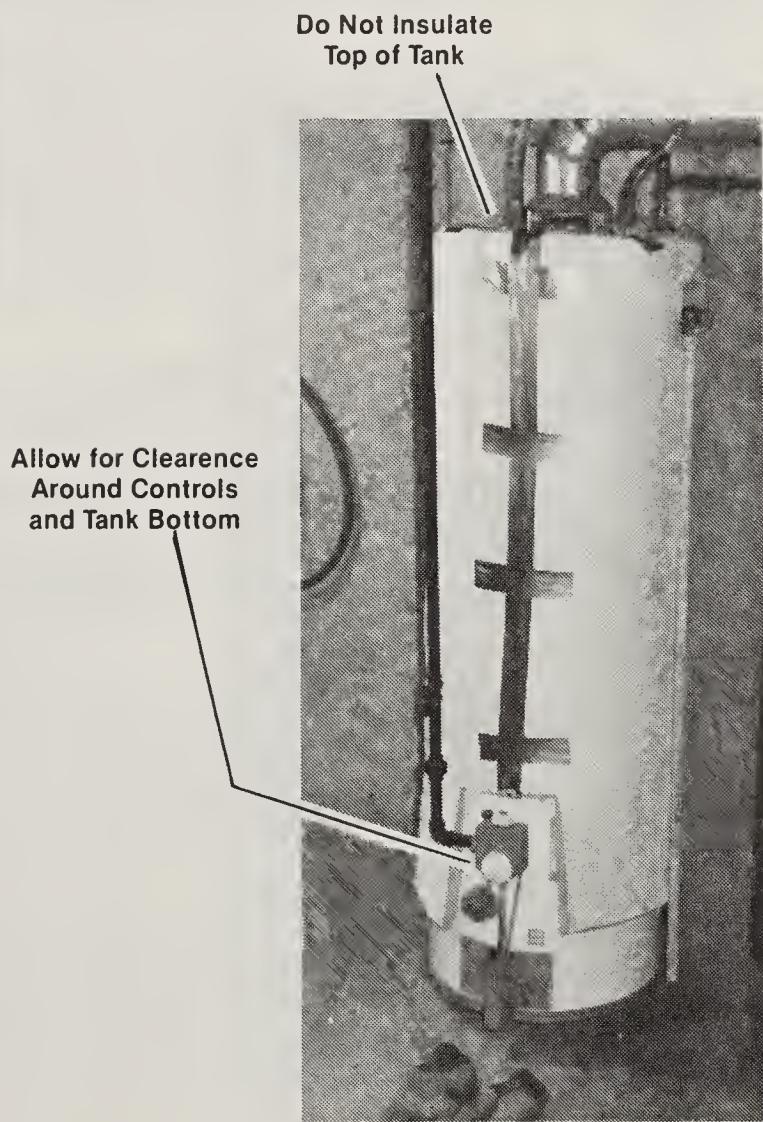


## OTHER WAYS TO LOWER HOT WATER EXPENSES

Lowering the temperature setting on your hot water heater to 120 degrees F or the low setting is the first step in lowering hot water expenses. Many homes have water heater temperature settings set higher than needed for normal household uses. Lowering the thermostat setting 18 degrees will produce 11 percent energy savings in electric water heaters and 13 percent in gas models. If this change in thermostat setting results in spotty dishes in the

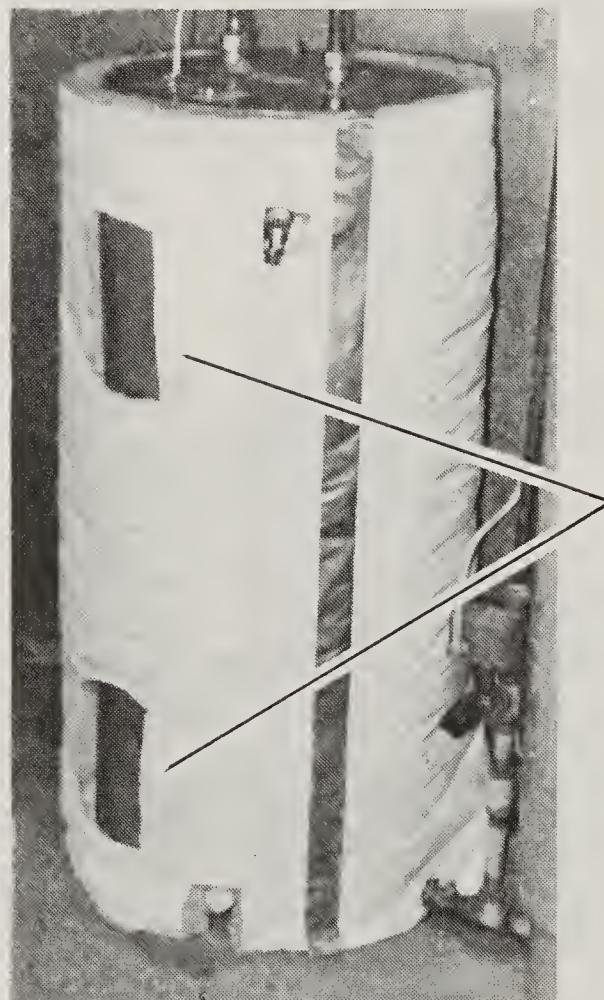
automatic dishwasher, or if there isn't enough hot water for all your household needs, you can always turn the dials back up a little. The lower the setting you can live comfortably with, the more money you will save.

Turning down the thermostat is an easy task. At the front of most hot water heaters are one or two plates held on by screws. Turn off the circuit breaker (if you have an electric water heater) and remove the plates. Push back the insulation and you will see the thermostat. It will either have numerical settings or simply the designations "high," "medium," or "low." Reset the thermostat setting to 120 degrees F or "low." After replacing the insulation and reinstalling the metal plates, turn the circuit breaker to its "on" position.



A switch to a lower temperature on the washing machine also can reduce hot water expenses. A hot wash and warm rinse combination, the highest setting on most machines, requires 25 gallons of hot water. Changing the rinse water to cold, which the experts say does not affect washing results, will save 8 of those gallons. The recommended setting for energy efficiency is a warm wash and cold rinse combination. You will still achieve good results and save 17 gallons of hot water in the process.

Reducing the volume of hot water demanded is another means to save money. Installing a shower flow restrictor between the showerhead and shower arm reduces demand from five gallons per minute to three gallons per minute. The showerhead will continue to emit a good spray and you don't have to take a shorter shower to save money.



You can increase the operating efficiency of your hot water heating system by insulating the hot water pipes. Your pipes can be wrapped with a roll of fiberglass pipe insulation or the job can be done with sections of four foot long foam sleeves. Either method will reduce heat losses from hot water pipes, especially in unheated areas like a crawl space. There is also less waiting time at the sink when you turn on the hot water faucet.

When you replace your present water heater, be sure to read the ENERGY GUIDE appliance labels carefully when shopping for a new one. The labels will tell you at a glance how energy efficient a particular model is compared to similar models. The most energy efficient models will usually repay their higher initial cost in a few years and then begin saving you money each year thereafter.

You may want to investigate the use of a solar heating system to heat your hot water. Heating water with the sun is one of the best approaches to using solar energy. Systems can be sized to supply 50 to 75 percent of your hot water needs. Some utilities will even provide a no-interest loan to customers who want to purchase a solar heating system.

The Department of Natural Resources and Conservation is not responsible for any results that may or may not follow the adoption of any of the suggestions set forth in this pamphlet.



The following publications are available from the Energy Division, DNRC, Capitol Station, Helena, MT 59620:

**Montana Energy Saving Handbook for Homeowners.** This comprehensive handbook shows you how to insulate your home, maintain the heating system and do heat-loss calculations. It also includes step-by-step, illustrated directions for many other home energy-saving measures.

**The Montana Renewable Energy Handbook.** This handbook gives a thorough introduction to renewable energy systems. Solar, wind, hydro, biomass and geothermal technologies are explained with specific examples of their use in Montana.

**The Montana Sunpower Series: Volume 1—Active Solar Homes.** This book covers active solar space and hot water heating systems in Montana homes. It describes the basic principles of active solar heating details system design and construction and presents comments and suggestions about system operation from Montanans who have installed active solar systems in their homes.

**Volume II—Passive Solar Homes.** This book includes a sampling of cost-effective passive solar homes and greenhouses that have been built in Montana. Building materials, construction techniques and system performance are discussed. Comments and suggestions for improving system performance from Montanans who own passive solar homes are also included.

**Twelve Ways To Turn Down High Energy Bills.** This brochure lists no-cost and low-cost steps you can take to reduce your energy bills.

**Guidelines For Preparing Grant and Loan Applications.** This guide is designed to help people interested in applying for funding through Montana's Renewable Energy and Conservation Program.

#### **Montana's Energy Resources**

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- Hydropower
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These units provide introductory information on conservation and renewable energy systems and their use in Montana.

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